MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2018/19

ETN4116 – ADVANCED NETWORKING TECHNIQUES

(TN, TE)

9 MARCH 2019
9:00 a.m. – 11:00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 5 pages (including this cover page) with 4 Questions only.

2. Answer **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please print all your answers in the Answer Booklet provided.

Question 1

(a) Identify the transport protocol to be used for each of the following network applications. Explain your answer.

(i) Sharing video files between two end hosts.

[2 Marks]

(ii) Streaming video to subscribers in the same Ethernet.

[2 Marks]

(iii) Online purchase and banking.

[2 Marks]

(iv) Query the Domain Name System (DNS) server.

[2 Marks]

(b)

(i) From an Internet Service Provider (ISP) point of view, Post Office Protocol version 3 (POP3) and Internet Message Access protocol (IMAP) differ in an important way. POP3 users generally empty their mailboxes every day. IMAP users keep their mail on the server indefinitely. Imagine that you were called in to advise an ISP on which protocol it should support. What considerations would you bring up?

[4 Marks]

(ii) Does Google Mail (Gmail) use POP3, IMAP, or neither? If one of these, why was that one chosen? If neither, which one is it closer to it's spirit?

[2 Marks]

(c) Briefly describe Domain Name System (DNS). Why DNS servers are deployed distributed hierarchically and not centralized?

[3 Marks]

(d) Consider the network shown in Figure Q1d. Given that user from the Local Area Network (LAN) accessing an average of 2 Mbits of object size from the external orrigin server with a request of 25 request per second.

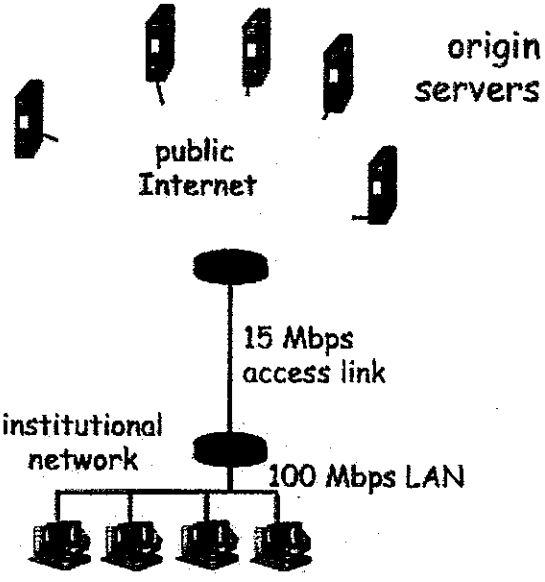

Figure Q1d

Continued.....

(i) Calculate the traffic intensity on the Local Area Network (LAN).

[2 Marks]

(ii) Calculate the traffic intensity on the access link.

[2 Marks]

(iii) If now the the speed of the access links is similar to the LAN speed, discuss what are the impacts to the institution.

[2 Marks]

(iv) If the institute use proxy server, list two (2) benefits gain by implementing the proxy server.

[2 Marks]

Question 2

(a) (i) Describe why an application developer may choose to run its application over User Datagram Protocol (UDP) rather than Transport Control Protocol (TCP.)

[3 marks]

(ii) Suppose two TCP connections are present over some bottleneck link of rate *R* bps. Both connections have a huge file to send (in the same direction over the bottleneck link). The transmissions of the files start at the same time. What is the transmission rate that TCP would like to give to each of the connections?

[2 Marks]

(b) Most routing protocols are based on either link-state or distance-vector approach. Given the network link in **Figure Q2a** where the link cost for each node is given in the diagram, answer the following question.

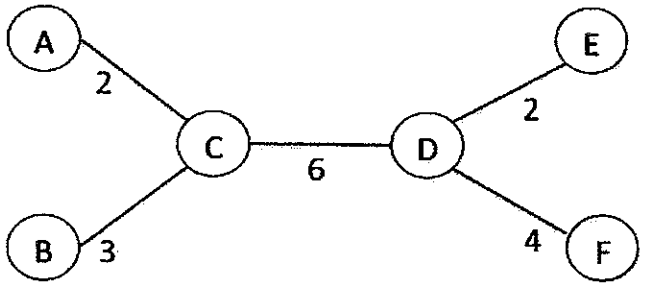

Figure Q2a

Node C routing table

Destination	Next Node	Cost
A		
B		
D		
E		
F		

(i) Compare between distance-vector and link state routing.

[2 Marks]

(ii) By using distance-vector routing, what is the final routing table for node C (use the routing table format given in **Figure Q2a**)?

[5 Marks]

(iii) By using link state routing, what is the final routing table for node C (use the routing table format given in **Figure Q2a**)?

[5 Marks]

Continued.....

(c) The TCP/IP network layer is used for delivering datagrams from source to destination. Explain the relationship and function of the following in datagram routing and forwarding:

- Router
- Routing table
- Routing protocol

[6 Marks]

(d) Identify when to use Classless Interdomain Routing (CIDR).

[2 Marks]

Question 3

(a) In an Internet phone application, how do you design a UDP protocol based voice communication? How do you cater for the packet loss and delay?

[6 Marks]

(b) Consider a video streaming application with the following features:

- Use Real Time Streaming Protocol (RTSP)
- Use TCP for video data transport
- Use a constant bit-rate codec of 1Mbps for video data

The application is to be used over the best-effort based Internet.

(i) RTSP is located at which TCP/IP protocol layer?

[1 Mark]

(ii) Discuss the functions of RTSP.

[3 Marks]

(iii) Explain the best-effort service model.

[3 Marks]

(iv) Discuss the limitation of the best-effort service model in serving the video traffic.

[2 Marks]

(v) Discuss one simple forward error correction mechanism that can be used for the video streaming application.

[4 Marks]

(c) Name and explain three (3) out of four pillars in Quality of Service (QoS) principles.

[6 Marks]

Continued.....

Question 4

(a) What is packet sniffing? What harm can packet sniffing does to users?

[5 Marks]

(b) Explain the working principle of public key cryptography. How can we ensure the authenticity of the public key shared by a valid user?

[5 Marks]

(c) By using RSA (Ron Rivest, Adi Shamir, and Leonard Adleman) public key cryptosystem, answer the following questions.

(i) If $p = 11$ and $q = 7$, and $d = 13$, find e.

[4 Marks]

(ii) If $p = 17$, $q = 11$, and $e = 7$, find the public and secret key respectively.

[5 Marks]

(d) Identify the statements below either TRUE or FALSE. Explain your answers.

(i) Filter-based firewalls will be able to block packets based on IP addresses only.

[2 Marks]

(ii) Proxy-based firewalls can implement complex policy rules between internal network and external network access.

[2 Marks]

(iii) Firewall can protect user from internal penetrations but unable to prevent external attacts.

[2 Marks]

End of Paper